

## BACTERIAL SOURCE TRACKING

### Needs and opportunities identified by Gulf States in Water Quality White Paper:

- ◆ “Bacterial source tracking (BST) methods – These would help Gulf Coast states better address beach and shellfish contamination problems. *Enterococci* bacteria are indicators of fecal contamination and are found in human, avian, ruminant, and other animal fecal matter. While scientists are developing methods to identify the source of the contamination, more work in this area to develop reproducible, quantitative and inexpensive tests will help environmental agencies correct anthropogenic problems (e.g. leaking sewers). Further, if the risk of human illness from exposure to different animal wastes while swimming is known, state officials may issue appropriate warnings about swimming risks rather than provide beach advisories regardless of the source of the *Enterococci*. Several studies, focusing on bacterial sensitivity to antibiotics, bacterial genetic make-up, and other indicators of human effluent such as optical brighteners, are underway to better predict human sources of bacteria and identify the controllable sources. Additional collaboration with other states would speed up the progress.”
- ◆ “There is also an opportunity for the federal government to provide assistance to the states (e.g. through the USEPA Office of Research and Development) to improve indicators and develop reliable and rapid BST tools and in establishing specific recreational criteria for different sources of the bacteria and by possibly allowing Beach Act monies to be utilized in BST efforts.”
- ◆ “Concentrated effort to develop and standardize bacterial source tracking methods to ensure accurate, reproducible data for identifying impairment and source contribution ratios, establishing TMDLs, and correcting problems.”

**Federal Response:** The Federal Workgroup proposes developing molecular fingerprinting method(s) and a digital library to track animals associated with contaminated waters and also proposes establishing a Regional (five-state) Bacterial Source Tracking Team.

Although bacterial source tracking has become a research focus for many investigators throughout the country, there are few initiatives with regional focus and none that specifically considers the problems encountered in the southeastern United States. The five Gulf coastal states experience similar water temperatures, sediment concentrations, and climatic conditions, and contain large human populations that inhabit and impact the coastal zone. As the Gulf population increases, there will be greater impact on coastal waters and watersheds, greater pressure on municipal resources and from the public, and greater need for public officials to respond to bacterial contamination problems of communities and cities. In response, cities and counties could be required to add millions of dollars of new treatment facilities if they intend to continue to grow. Bacterial source tracking adds a new dimension to this equation because determining the animal of origin of contamination allows greater control of risk associated with contact with contaminated water and also allows greater understanding of the conditions which contribute to the pollution level observed; therefore, it is crucial to determine the organisms that produce disease in domestic and wild animals that can be transmitted to man by a water route.

The Federal Workgroup would develop molecular fingerprinting method(s) and a digital library for the top “250” animals suspected of impairing coastal waters along the five Gulf States. These BST efforts have the potential to more accurately focus Federal, state and local funding and conservation efforts on the actual source(s) of contamination, to fund efforts which will make a difference, and to

focus resources where they can do the most good. BST also has the potential to significantly improve the manner in which State program managers are able to determine and define multiple sources of bacterial contamination of their local waters. No other methods are currently available which answer these questions of contamination

Through this proposal, the Federal Workgroup would develop and administer a Regional (Five State) Bacterial Source Tracking Team to allow increased coordination amongst state and Federal BST activities. The efforts of this team would build upon existing EPA efforts to promote and financially support collaboration among the scientists engaged in BST projects around the northern coast of the Gulf of Mexico. Through sharing of data, testing of regional bacterial libraries, and discussion of problems encountered, researchers can provide information to environmental managers that will enable them to make proper use of new bacterial source tracking technology. The collaboration involves convening regular three-day meetings of BST researchers from the Gulf of Mexico region to discuss mutual problems and solutions and conduct field trips to the sampling sites in the region's area to get a first hand view of the area's ecology and water quality problems. Technical staff and graduate students from participating laboratories are given access to other laboratories in this consortium to see first hand the procedures in use and the way that data is analyzed. Participants are comparing the various procedures of data analysis and discussing standardization of analysis, sharing libraries of DNA and conducting round robins to compare the results obtained by different laboratories using different methods.

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**Other partners:** DOI, HHS/FDA

*This Federal Response Proposal represents an initial project idea from the 13 agencies represented on the Federal Workgroup, in response to the Gulf State Alliance white papers; it is meant to stimulate discussion, among the Gulf State Alliance and the Federal Workgroup, as they work toward the development of a draft Gulf Plan of Action. Implementation of this project idea is subject to further evaluation and the availability of funding.*